The Need

- Wheels for the World, an outreach of Joni and Friends, is attempting to provide a mobility option to individuals with disabilities around the world.
- Many people around the world suffer from a disability which renders them incapable of freely moving around their community.
- This lack of mobility causes adults to be unable to find employment and children to not have access to education.
- Individuals with disabilities are often seen as less valuable members of their society, deeply harming their sense of self-worth.

Our Goals

- Provide the gift of mobility to individuals around the world.
- Design a wheelchair that can be mass-produced by our client which costs less than $225.
- The design should be adjustable to different users and easily collapsible for easy transportation when not in use.
- The wheelchair will be partially assembled in the United States and shipped as a kit to its location where the rest of the assembly will take place based on user customization.

Design

- The Bumblebee wheelchair provided by Hope Haven was used as our design inspiration
- The team designed the wheelchair with the ability to be used on different surfaces
- Design was made for a 100kg (220lb) person with a safety factor of three

Seat: Common boat seat with ability to have height and angle adjusted
Arms: Light weight design with five different height positions
Wheels: Standard 24" tires with a wide rim base for stability and strength
Frame: Created by telescoping 1.5" and 1.75" steel stop-sign square tubing which allows for adjustability
Gravity Pins: Allow for easy adjustment of the frame and help with collapsibility
Footrest: Designed to be adjustable in angle and length and can withstand the full weight of the person
Push Handles: Attached to the wood block on the back of the chair and are removable for collapsibility
Shock Absorber: Implemented to account for uneven terrain and designed to be easily manufacturable

Testing

- Upon completion of the design stage of the project, the team has moved into testing the wheelchair and making design adjustments based on these observations.
- The team performed qualitative tests on the chair to make adjustments as necessary, such as changes to the arms' height and width, and has developed a set of quantitative standards that will be used in the future.
- The prototype will be sent to Wheels for the World over the summer to be tested and the design will be refined based on their feedback.

Documentation

Manufacturing manual:
- Includes engineering drawings of all of the individual parts (see left) and sub-assemblies
- Drawing tree was created to organize parts into a numbering system

Assembly manual:
- Mostly pictures with limited written directions to reduce problem of language barrier
- Will be delivered with the assembly kit

Acknowledgements

- Paul Dorthalina; Client
- Dr. Tim Van Dyke; Project Manager
- John Meyer; Engineering Technician
- Stephen Crooks
- Jamie Stark
- Randy Tran
- Dr. Emily Farrar
- Alex Issis
- Perri Katcher
- Nile Lewis
- Danielle Reimer
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“Do nothing out of selfish ambition or vain conceit. Rather, in humility value others above yourselves, not looking to your own interests but each of you to the interest of others.”
~ Philippians 2:3-4